

## Chapter 2 – Aviation Demand Forecasts

This chapter contains the general aviation forecasts (2008, 2013, and 2023) for the Lake Hood and ANC General Aviation Master Plan. It begins with a review of the assumptions and methodology used to develop the forecasts and then summarizes the forecast results. For the purposes of this forecast, general aviation is defined to include local and itinerant GA activity as well as “on-demand” air taxi activity. “On-demand” air taxi operations are those air taxi operations that remain after scheduled regional/commuter operations are removed from the FAA’s AT (Air Taxi) operations category.<sup>1</sup>

Forecasting is not an exact science. Deviations from the relied upon economic or aviation forecasts may significantly affect the projections presented in this section. These uncertainties increase toward the end of the forecast period when new technologies and business strategies and changes in work and recreational practices may unpredictably impact aviation activity. The forecasts should be periodically compared with actual airport activity levels, and airport plans should be adjusted accordingly.

### ***2.1 Historical and Projected Socioeconomic Data***

General aviation is an important mode of transportation in Alaska because the State is vast and very sparsely populated. As a result, Alaska’s transportation infrastructure differs from that of the lower 48 states. General aviation at Lake Hood and ANC provides Anchorage area residents and tourists with access to isolated areas of the State while also linking rural residents to the Anchorage area.

General aviation demand is often determined by the strength of the regional and national economy and the development of a GA forecast requires an understanding of economic forces and trends.

Tables 2.1 through 2.3 present historical and projected population and personal income data for Anchorage, the State of Alaska, and the United States. The historical population and income data is from the U.S. Bureau of Economic Analysis (BEA) and projected population and income data is from Woods & Poole, Inc, 2004 release (W&P). Data from the Institute of Social and Economic Research (ISER) also was considered for use in the forecasts; however data from W&P was chosen for use in the forecast for a number of reasons, including: 1) the most recent detailed forecast from ISER was published in

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<sup>1</sup> The FAA defines Air Taxi (AT) as aircraft designed to have a maximum seating capacity of 60 seats or less or a maximum payload capacity of 18,000.pounds or less carrying passengers or cargo for hire or compensation. This category includes regional/commuter aircraft with 60 seats or less.

October, 2001 whereas the W&P data was updated in 2004,<sup>2</sup> and 2) ISER does not provide projections for the U.S.

**Table 2.1**

**Historical and Projected Population**

<b>Year</b>	<b>Anchorage</b>	<b>Alaska</b>	<b>U.S.</b>
1989(a)	225,374	547,160	246,819,222
1990(a)	227,614	553,290	249,622,814
1991(a)	235,137	570,193	252,980,941
1992(a)	245,623	588,736	256,514,224
1993(a)	250,163	599,432	259,918,588
1994(a)	252,278	603,308	263,125,821
1995(a)	251,981	604,412	266,278,393
1996(a)	250,710	608,569	269,394,284
1997(a)	252,700	612,968	272,646,925
1998(a)	257,232	619,932	275,854,104
1999(a)	259,348	624,779	279,040,168
2000(a)	260,548	627,576	282,177,754
2001(a)	263,966	632,674	285,093,813
2002(a)	268,241	641,482	287,973,924
2003(b)	271,289	649,017	291,017,572
2008(b)	286,758	684,624	305,507,878
2013(b)	302,786	721,778	320,678,034
2023(b)	336,812	800,791	353,124,202

**Average Annual Growth Rate**

<b>1989-2003</b>	<b>1.3%</b>	<b>1.2%</b>	<b>1.2%</b>
<b>2003-2023</b>	<b>1.1%</b>	<b>1.1%</b>	<b>1.0%</b>

(a) Bureau of Economic Analysis, May 25, 2004 release.

(b) Woods & Poole Economics, Inc. 2004, adjusted by ratio of BEA data for 2002 to W&P data for 2002.

Tables 2.2 and 2.3 present total personal income and per capita personal income (PCPI) in constant 2003 dollars. Over the last 15 years, total personal income in Anchorage (2.3% per year) and Alaska (2.2% per year) has grown slightly more slowly than it has nationally (2.8% per year). In the future, income in each region is expected to slow slightly; however, the slowdown is expected to be more pronounced nationally than it will be in either Anchorage or statewide.

**Table 2.2**

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<sup>2</sup> ISER population and income projections for 2001 and 2002 were compared to BEA estimates for the 2001 and 2002 (only years for which BEA estimates are currently available). Thus far, the ISER population projections are tracking above BEA data and ISER income projections are tracking below BEA data.

**Historical and Projected Personal Income  
(thousands of 2003\$s)**

**Year**  
**Anchorage**  
**Alaska**  
**U.S.**

1989(a)  
7,582,253  
16,192,972  
6,254,931,446

1990(a)  
7,684,687  
16,508,879  
6,361,442,635

1991(a)  
7,776,332  
16,674,583  
6,353,660,961

1992(a)  
8,078,519  
17,185,770  
6,564,875,440

1993(a)  
8,288,131  
17,643,908  
6,655,230,335

1994(a)  
8,361,594  
17,754,238  
6,853,638,984

1995(a)  
8,231,398  
17,728,942  
7,067,220,436

1996(a)  
8,206,361  
17,681,400  
7,332,436,985

1997(a)  
8,526,148

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## Lake Hood and ANC General Aviation Master Plan

18,161,101  
7,648,067,185

1998(a)  
8,873,918  
18,749,083  
8,137,901,919

1999(a)  
8,988,816  
18,951,008  
8,415,353,621

2000(a)  
9,245,426  
19,739,408  
8,870,549,441

2001(a)  
9,919,428  
20,791,135  
8,983,289,698

2002(a)  
10,227,548  
21,425,958  
9,063,156,729

2003(b)  
10,442,185  
21,891,060  
9,257,771,650

2008(b)  
11,598,145  
24,277,578  
10,273,995,722

2013(b)  
12,869,684  
26,902,339

11,426,177,559

2020(b)  
15,724,042  
32,866,010  
14,134,627,920

**Average Annual Growth Rate**

**1989-2003**

2.3%  
2.2%  
2.8%

**2003-2023**

2.1%  
2.1%  
2.1%

*(a) Bureau of Economic Analysis, May 25, 2004 release.*

*(b) Woods & Poole Economics, Inc. 2004, adjusted by ratio of BEA data for 2002 to W&P data for 2002.*

The picture is slightly different when total personal income and population are examined together in the form of PCPI (Table 2.3). Over the last 15 years, total personal income in Anchorage has grown faster than has population. As a result, PCPI has increased by about one percent per year. However, the gap between PCPI in Anchorage and PCPI nationally has narrowed slightly (See Anchorage/US ratio in Table 2.3). In the early nineties, PCPI in Anchorage was about 30 percent higher than the national average but is now about 20 percent higher than the national average.

**Table 2.3**

**Historical and Projected Per Capita Personal Income  
(thousands of 2003\$s)**

Year	Anchorage	Alaska	U.S.	Anchorage/ US
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## Lake Hood and ANC General Aviation Master Plan

				Ratio (c)
1989(a)	33,643	29,595	25,342	1.33
1990(a)	33,762	29,838	25,484	1.32
1991(a)	33,071	29,244	25,115	1.32
1992(a)	32,890	29,191	25,593	1.29
1993(a)	33,131	29,434	25,605	1.29
1994(a)	33,144	29,428	26,047	1.27
1995(a)	32,667	29,333	26,541	1.23
1996(a)	32,732	29,054	27,218	1.20
1997(a)	33,740	29,628	28,051	1.20
1998(a)	34,498	30,244	29,501	1.17
1999(a)	34,659	30,332	30,158	1.15
2000(a)	35,485	31,453	31,436	1.13
2001(a)	37,578	32,862	31,510	1.19
2002(a)	38,128	33,401	31,472	1.21
2003(b)	38,491	33,730	31,812	1.21
2008(b)	40,446	35,461	33,629	1.20
2013(b)	42,504	37,272	35,631	1.19
2023(b)	46,685	41,042	40,027	1.17
<b>Average Annual Growth Rate</b>				
<b>1989-2003</b>	<b>1.0%</b>	<b>0.9%</b>	<b>1.6%</b>	
<b>2003-2023</b>	<b>1.0%</b>	<b>1.0%</b>	<b>1.2%</b>	

(a) Bureau of Economic Analysis, May 25, 2004 release.

(b) Wood and Poole Economics, Inc. 2004, adjusted by a ratio of BEA data for 2002 to W&P data for 2002.

(c) Anchorage PCPI/U.S. PCPI.

Over the forecast period, PCPI in Anchorage and in the State of Alaska is expected to grow at about 1 percent per year whereas PCPI at the national level is expected to grow at 1.2 percent per year over the same time period.

### 2.2 Historical General Aviation Activity

In addition to socioeconomic factors, the behavior of the national general aviation industry (e.g., registered aircraft, aircraft utilization, maintenance and purchase costs, and pilot trends) can also be a key determinant of the level of local GA activity. Over the last 15 years, Lake Hood operations have declined by about 2.4 percent per year and GA operations at ANC have declined about 1.4 percent per year (Table 2.4).<sup>3</sup> However, both airports have experienced the volatility of the aviation industry as GA activity has fluctuated from year to year (Figure 2-1).

**Table 2.4**

Historical GA Activity			
Year	Lake Hood	Anchorage	Total Operations.

<sup>3</sup> Aircraft operations equal the sum of all aircraft landings and takeoffs.

## Lake Hood and ANC General Aviation Master Plan

	Operations(a)	Operations(b)	
1989	82,505	85,714	168,219
1990	83,782	88,829	172,611
1991	85,746	94,215	179,961
1992	81,486	71,696	153,182
1993	89,544	64,213	153,757
1994	91,589	58,463	150,052
1995	89,638	57,970	147,608
1996	80,602	51,468	132,070
1997	82,208	60,254	142,462
1998	74,494	68,888	143,381
1999	66,780	75,759	142,539
2000	65,225	79,484	144,709
2001	67,683	68,115	135,798
2002	67,013	71,404	138,417
2003	58,354	70,723	129,077
	<b>Average Annual Growth Rate</b>		
<b>1989-2003</b>	<b>-2.4%</b>	<b>-1.4%</b>	<b>-1.9%</b>

Source: Airport statistics.

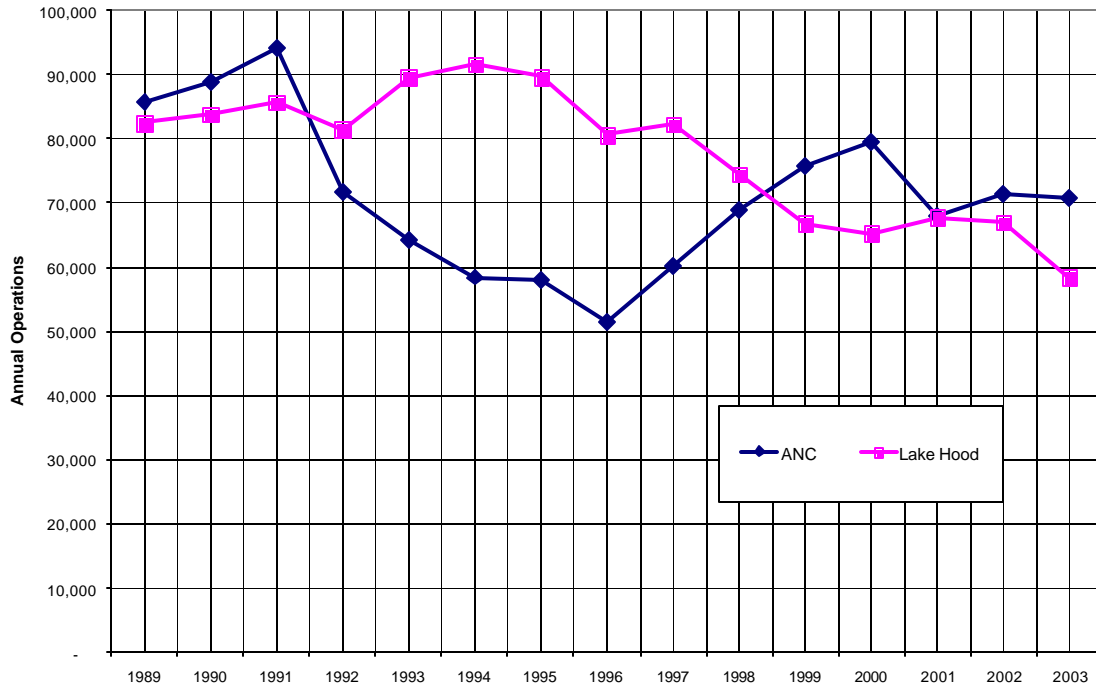
(a) Includes Lake Hood GA and Air Taxi (AT) operations. All Lake Hood AT assumed to be "on-demand".

(b) Includes ANC GA operations and estimated ANC "on-demand" AT operations. "On-demand" air taxi operations are those AT operations that remain after the estimated number of scheduled regional/commuter operations in the AT category are removed.

Annual operations at Lake Hood fluctuated between 80,000 and 90,000 for most of the '90s before dropping off at the end of the decade. They then remained somewhat flat for a few years before dipping in 2003.

General aviation operations at ANC dropped significantly in the early '90s only to rebound in the late 1990s. They dropped off again in 2001 and have remained relatively flat since then. Operations at Lake Hood did not display the same sort of reaction to the events of 9/11 as did GA activity at other airports around the country.

**Figure 2-1**  
**Historical Lake Hood and ANC General Aviation Operations, 1989-2003**



### 2.3 Forecasted General Aviation Activity

This section summarizes the assumptions, methodology, and results of the GA activity forecasts.

#### 2.3.1 General Forecast Assumptions

The following forecast assumptions were applied to all the forecasts described below:

1. *General Economic Assumptions:* The forecasts assume no major economic downturn, such as occurred during the depression of the 1930s. Local, national, and international economies will periodically increase and decrease with the pace of growth in accordance with business cycles. However, it is assumed that, over the 20-year forecast term, the high- and low-growth periods will offset each other.
2. *Percentage of Lake Hood based aircraft using ANC runways:* It was assumed that approximately 6.5 percent of Lake Hood based aircraft use ANC runways. Further, it was assumed that this percentage will remain constant over the forecast period.<sup>4</sup>
3. *Based aircraft:* The number of based aircraft at Lake Hood and ANC has remained fairly constant over the last 15 years. The GA forecasts are based on the following count of based aircraft at Lake Hood and ANC:

	Lake Hood	ANC
Aircraft in State-Owned Space	680	0

<sup>4</sup> The 6.5% breakout is based on an observation survey conducted by Airport staff between 10:00 a.m. and 8:00 p.m. during a 12-day period (July 19 – August 1, 2004)..



Aircraft on Lease Land	339	41
<b>Total</b>	<b>1,049</b>	<b>41</b>

*Assumptions about growth in based aircraft over the forecast period are discussed below*

4. *Tiedown fee structure:* The forecasts assume no major increase in tie-down fees over the forecast period.
5. *Physical Constraints:* For the purpose of this forecast, Lake Hood and ANC are assumed to be physically unconstrained. For the purposes of this study, “physically unconstrained” means that there is sufficient airfield and landside facilities at Lake Hood and ANC to accommodate GA activity dictated by demand.
6. *Environmental and Noise Assumptions:* The forecast is based on current noise and emissions requirements. Changes in these regulations may affect the projections presented in this section.

### **2.3.2 Forecasted Lake Hood GA Activity**

Two approaches were taken to forecast activity at Lake Hood:

- ▶ Regression Analysis Approach
- ▶ Based Aircraft Approach

A number of FAA funded studies have shown that activity levels at small GA airports are highly dependent on “local factors”.<sup>5</sup> These local factors may include population, employment (overall and by industry), personal income, pilot population, and aircraft registrations. With this in mind, regression analysis—a statistical method that is used to generate an equation that best explains the historical relationship among variables—was employed to forecast operations at Lake Hood in each of the forecast years, 2008, 2013, and 2023. In addition, a forecast of based aircraft and operations per based aircraft was prepared (based aircraft operations x per based aircraft = operations).

The following sections describe each of the forecast approaches and the results of each forecast.

#### *Regression Analysis Approach*

Regression analysis was used to determine which local variables (independent variables) have historically best explained the number of operations at Lake Hood (dependent variable).

#### *Methodology—Regression Analysis Approach*

Using historical data (1989-2003), a list of independent variables were tested, including personal income, population, Permanent Fund Dividends, petroleum production, aircraft operating costs, as well as the number of active pilots and registered aircraft. Additionally, a number of instrument variables (dummy variables) were tested, including a variable that represented the 1989 Exxon Valdez Oil Spill and associated clean-up that

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<sup>5</sup> *Model for Estimating General Aviation Operations at Non-towered Airports Using Towered and Non-towered Airport Data*, GRA, Inc for the FAA, July 2001. Small GA airports is defined as airports with less than 100,000 GA operations.

continued into the years following the spill.<sup>6</sup> All of the income variables are in 2003 dollars.

The model that produced the best results, from both a theoretical and statistical standpoint, was a logarithmic formulation, which specified Lake Hood operations (LHDOPS) as a function of active pilots per capita (PILOTPERCAP)<sup>7</sup>, the ratio of Anchorage per capita income to U.S. per capita income (INCOMERAT), and a dummy variable representing the Exxon Valdez oil spill and cleanup (EXXON). The following equation resulted:

$$\text{Equation 1.} \\ \text{LHDOPS} = 10^{-0.504} \times \text{INCOMERAT}^{1.311} \times \text{EXXON}^{-0.118} \times \text{PILOTPERCAP}^{1.870}$$

R-squared	0.91174424
Corrected R-squared	0.88767449
F-test	37.879
Durbin-Watson statistic	1.613564
T-statistic (intercept)	1.1861
T-statistic (INCOMERAT)	2.4945
T-statistic (EXXON)	-4.2018
T-statistic (PILOTPERCAP)	6.4682
Degrees of Freedom	13

Figure 2-2 displays the historical behavior of the factors that were used in the regression formula. The PCPI in Anchorage was 33 percent higher than the U.S. average in 1989 but by 2003 the gap had closed somewhat. In 2003, PCPI in Anchorage dropped to within 21 percent of the U.S. average after dipping to within 13 percent in 2000. The number of active pilots per capita also has dropped off in the last 15 years. Between 1989 and 2003 the number of active pilots per capita decreased by about 2.5 percent per year—the total number of active pilots in Alaska decreased by 1.2 percent per year while the population in Anchorage grew by about 1.3 percent per year (See footnote for formula).

**Figure 2-2**  
**Historical Behavior of Regression Variables**

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<sup>6</sup> Instrument or dummy variables are used to control for variables that are qualitative and thus not quantifiable (e.g. worker strike, war, gender etc.). In other words, instrument variables are artificial variables used to control for qualitative effects. These variables indicate the existence or absence of an event or attribute and are represented by either a zero (absence of a quality) or a one (existence of a quality). The Exxon Valdez dummy variable equals one in 1989-1992 to account for the existence of the spill and associated clean-up. The variable equals zero in all other years.

<sup>7</sup> Historical pilot data was only available at the state level and thus the number of pilots per capita reflects the number of active pilots in the State of Alaska per 100 Anchorage residents [Active Pilots in Alaska/(Anchorage Population/100)].

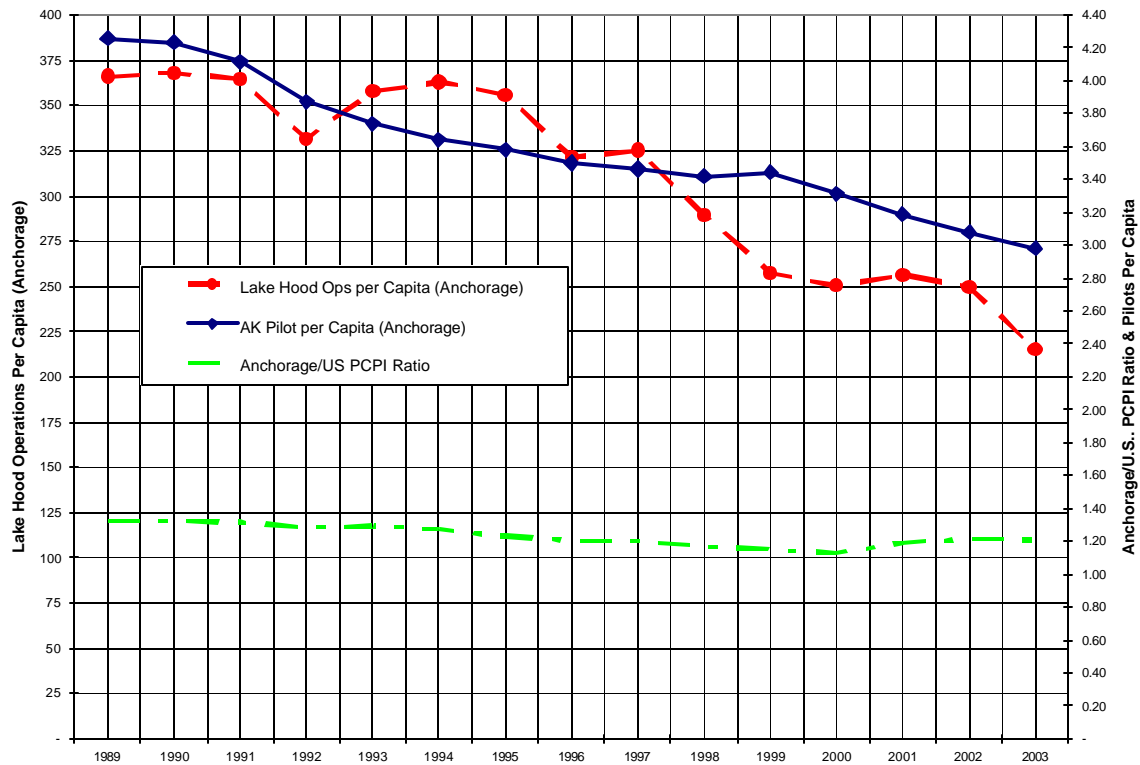
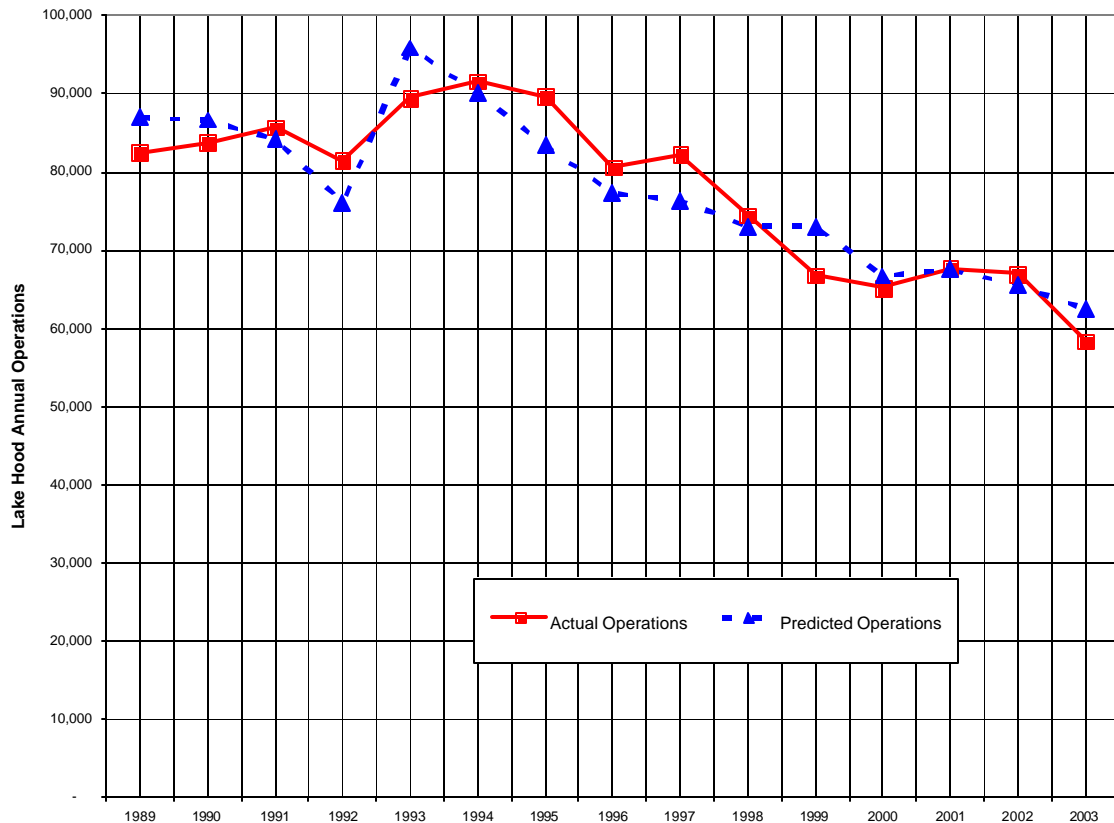


Figure 2-3 shows actual historical Lake Hood operations plotted against the number of operations estimated by the regression equation. The model performs quite well as the two lines (actual and predicted) follow a similar path, diverging only slightly in a few instances.

**Figure 2-3**  
**Actual versus Predicted Operations, Lake Hood 1989-2003**



Estimated operations do not diverge at all from actual operations in 2001—the year of the September 11<sup>th</sup> terrorist attacks, indicating that operations at Lake Hood were not as significantly impacted by the attacks as were GA operations at many other airports in the country.

Since the model has a logarithmic formulation, the exponent associated with each input variable represents an elasticity.<sup>8</sup> For example, for every one percent increase in the PCPI ratio, the number of operations will increase by approximately 1.3 percent (See Equation 1).

<sup>8</sup> An elasticity is the measurement of the percentage change in one variable that results from a 1% change in another variable.

If it is assumed that the historical relationship between variables will continue throughout the forecast period, this equation can be used to forecast Lake Hood operations over the forecast period. However, it was necessary to input PCPI and active pilot projections into Equation 1 in order to use the regression equation to forecast Lake Hood operations.

PCPI projections for the U.S. and Anchorage are from W&P as described in the socioeconomic section of this report (See Table 2.3). The estimated Anchorage/U.S. PCPI ratio was derived from these projections and, as shown in Table 2.3, this ratio is expected to drop from 1.21 (PCPI in Anchorage is 21 percent higher than PCPI for the U.S. as a whole) in 2003 to 1.17 in 2023 (PCPI in Anchorage is projected to drop to within 17 percent of the PCPI for the U.S. as a whole).

The future number of pilots per capita was estimated using a variety of FAA statistics and Anchorage population projections from W&P (Table 2.1). The FAA *Aerospace Forecasts*<sup>9</sup> provide projections for the total number of active pilots in the U.S.; however, over the last 15 years, the number of active pilots in Alaska has declined by about 1.2 percent per year compared to a drop of only about 0.7 percent in the U.S. As a result, the FAA pilot projections for the U.S. were adjusted downwards slightly to better reflect the trend in active pilots in Alaska.

According to the FAA *Aerospace Forecasts*, the number of student pilots increased last year following three consecutive years of decline and an increase in the number of student pilots is the key to the future of general aviation. Additionally, the general aviation industry has initiated, and continues to promote, a number of programs designed to attract new pilots. As a result, the FAA predicts that the pilot population will increase by about 1.6 percent per year over their 12-year forecast period.<sup>10</sup>

When this increase is adjusted downwards to better reflect the trend in the number of active pilots in Alaska, the resulting average annual growth rate for pilots in Alaska is 0.8% percent per year. This growth rate is slower than the expected average annual growth in Anchorage population (1.1% per year); therefore, the number of active pilots per capita is expected to decrease by about 0.3 percent per year over the forecast period.

### *Results—Regression Analysis Approach*

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<sup>9</sup> FAA's *Aerospace Forecasts, Fiscal Years 2004-2015*, March 2004, Table 31.

<sup>10</sup> The FAA growth rate is extrapolated to 2023 for use in this forecast.

Table 2.5 presents the results of the Lake Hood operations forecast using regression analysis:

**Table 2.5**  
**Regression Analysis Approach Forecast**

<b>Forecast Year</b>	<b>Projected Lake Hood Operations</b>
2003*	58,354
2008	63,789
2013	65,048
2023	67,231
<b>Average Annual Growth 2003-2023</b>	<b>0.71%</b>

*\*Actual operations.*

Between 2003 and 2023, operations at Lake Hood are expected to increase, on average, at about 0.7 percent per year.

*Methodology—Based Aircraft Approach*

The Based Aircraft Approach involved two projections: 1) growth in based aircraft at Lake Hood and 2) growth in the number of operations per aircraft at Lake Hood.

Growth in based aircraft at Lake Hood is based on projected national growth rates from the FAA *Aerospace Forecasts*. It should be noted that the FAA forecasts consider projected future economic conditions and aircraft purchase and operating costs, as well as possible future government and industry programs and initiatives designed to “promote and assure” future growth in the industry.

The FAA forecast provides active aircraft projections by type of aircraft (single engine piston, jet etc.) and these growth rates were used to develop a weighted (by mix of Lake Hood based aircraft) growth rate for based aircraft at Lake Hood. This weighted growth rate (0.27% per year) was then adjusted upwards slightly to reflect the historic trend of aircraft registrations in Anchorage. As shown in Table 2.6, aircraft registrations have grown faster in Anchorage (1.2% per year) than they have nationally (0.6% per year) over the last 15 years.

**Table 2.6**  
**Historical Aircraft Registrations**

<b>Year</b>	<b>U.S.</b>	<b>Anchorage</b>	<b>Anchorage Percent of U.S.</b>
1989	194,400	3,518	1.8%
1990	203,400	3,562	1.8%
1991	198,000	3,617	1.8%
1992	185,650	3,507	1.9%
1993	177,120	3,542	2.0%
1994	172,935	3,585	2.1%
1995(a)	188,089	3,617	1.9%
1996	191,129	3,543	1.9%
1997	192,414	3,606	1.9%
1998	204,710	3,858	1.9%
1999	219,464	3,866	1.8%
2000	217,533	4,027	1.9%
2001(b)	211,447	4,062	1.9%
2002	211,244	4,097	1.9%
2003	211,190	4,131	2.0%
2004	219,100	4,166	1.9%
<b>Average Annual Growth Rate</b>			
<b>1989-2003</b>	<b>0.6%</b>	<b>1.2%</b>	

*Source: Anchorage Area General Aviation System Plan, February 2004, FAA Aerospace Forecasts, Fiscal Years 2004-2015, and FAA's list of registered aircraft in Anchorage as of May, 2004.*

*(a) The jump in registrations in the U.S. between 1994 and 1995 is because 1995 was the first year that includes experimental aircraft.*

*(b) Interpolated.*

The resulting adjusted growth rate, 0.8% percent per year<sup>11</sup>, was then used to forecast based aircraft at Lake Hood over the forecast period. As shown in Table 2.7, based aircraft at Lake Hood are projected to increase from 1,049<sup>12</sup> in 2003 to approximately 1,238 in 2023.

<sup>11</sup> Represents the difference in the growth in Anchorage aircraft registrations (1.2%) and growth in aircraft registrations nationwide (0.6%).

<sup>12</sup> See assumption #3 in the General Assumptions section.

**Table 2.7**

**Forecast Operations at Lake Hood**

<b>Year</b>	<b>Based Aircraft</b>	<b>Operations per Based Aircraft(a)</b>	<b>Total Operations(b)</b>
2003 (c)	1,049	55.6	58,354
2008	1,093	56.8	62,125
2013	1,139	58.0	66,140
2023	1,238	60.6	74,966
<b>2003-2023</b>	<b>0.83%</b>	<b>0.43%</b>	<b>1.26%</b>

**Average Annual Growth Rate**

(a) The operations in this ratio include operations by based and transient aircraft.

(b) Based Aircraft x Operations per Based Aircraft.

(c) Actual Data. See General Assumptions.

Growth in the number of operations per based aircraft also is based on projected national growth rates from the *FAA Aerospace Forecasts*. The FAA projects hours flown by type of aircraft and these projections were divided by the FAA's projection for each type of aircraft (pro-rated growth in hours flown by the anticipated increase in each type of aircraft) to derive projections for operations per based aircraft. The number of operations used in the calculation of operations per based aircraft includes transient and based aircraft operations.

Similar to the based aircraft projections, the FAA's projections for operations per based aircraft were weighted by the fleet mix at Lake Hood to derive a growth rate for operations per based aircraft at Lake Hood. The resulting average annual growth rate is approximately 0.43%.

The estimate of operations per based aircraft in 2003 is 55.6 (58,354 divided by 1049). When this estimate is grown at 0.43 percent per year, the resulting projection of operations per based aircraft in 2023 is 60.6 (Table 2.7).

**Results—Based Aircraft Approach**

Total operations in each forecast year are calculated by using the projected number of based aircraft and the projected number of operations per based aircraft.



As shown in Table 2.7, total aircraft operations at Lake Hood are projected (using the based aircraft method) to grow by nearly 1.3 percent per year over the forecast period from 58,354 in 2003 to 74,966 in 2023.

### *Summary of Lake Hood Activity Forecasts*

The growth rates derived from both the Based Aircraft Approach and the Regression Analysis Approach deviate from the general decline in operations seen at Lake Hood in the last 15 years (See Table 2.4 and Figure 2-1). Operations levels at Lake Hood are expected to turn upwards in response to projected economic growth both nationally and in Alaska and the anticipated recovery of the general aviation industry.

A number of recent studies expect tourism, both nationally and in Alaska, to gain strength in the coming years, which should increase demand at Lake Hood.<sup>13</sup> Although the increasing cost of fuel and the recent economic downturn have adversely affected the general aviation industry, the FAA's most recent forecast indicates that the general aviation industry is beginning to show signs of life. As mentioned previously, the number of student pilots increased last year following three consecutive years of decline and the FAA predicts the pilot population to grow. Additionally, the General Aviation Revitalization Act of 1994 (GARA) has begun to have a positive impact on the industry. GARA brought product liability reform to the industry by amending the Federal Aviation Act of 1958 to establish time limitations on certain civil actions against aircraft manufacturers.

As shown in Tables 2.5 and 2.7, operations at Lake Hood are projected to grow more slowly over the forecast period under the Regression Analysis Approach (0.7% per year) than they are under the Based Aircraft Approach (nearly 1.3% per year). Recognizing the unique nature of Lake Hood, it was decided to present the results of the Lake Hood forecast as a range. The forecast derived from the Regression Analysis Approach may better capture the forces driving demand at Lake Hood. However, the higher forecast indicated by the Based Aircraft Approach may be useful for facility planning purposes. The Lake Hood forecast is further discussed later in this section.

The FAA combines Lake Hood and ANC operations in its Terminal Area Forecast (TAF); therefore, comparisons to the TAF will be made after the GA forecast for ANC is discussed.

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<sup>13</sup> National tourism forecast from Travel Industry of America, *Travel Forecast*, 2003. Local/State tourism forecast from 2004 *Anchorage Economic Forecast*, ISER, *Economic Projections for Alaska and the Southern Railbelt, 2000-2025*,

### **2.3.3 Forecasted ANC GA Activity**

The same two approaches that were used to forecast operations at Lake Hood also were analyzed for use in forecasting GA operations at ANC; however, the Regression Analysis Approach did not yield an equation that was suitable, either statistically or theoretically, for use in forecasting GA operations at ANC.<sup>14</sup> A large list of variables was tested, including demographic and industry statistics (pilot and aircraft registration statistics etc.), but none were strongly correlated with GA activity at ANC.

As a result, only the results of the Based Aircraft Approach are presented for ANC. Similar to the Lake Hood forecast, the ANC GA forecast encompasses both GA and “on demand” air taxi operations.

As mentioned above, it has been shown that activity levels at small GA airports are highly dependent on “local factors”. ANC is a major international airport and, although some of the GA activity at ANC is characteristically similar to Lake Hood activity, the more diverse GA activity at ANC may be driven by a wider range of more complex factors than is activity at Lake Hood. This may help to explain why ANC GA activity is not as amenable to forecasting by means of regression analysis.

#### *Methodology—Based Aircraft Approach*

The methodology used for the ANC Based Aircraft Approach was very similar to that used to forecast operations at Lake Hood and involved: 1) growth in based aircraft and 2) growth in the number of operations per based aircraft.

Growth in based aircraft at ANC also is based on projected national growth rates from the *FAA Aerospace Forecasts*. The FAA forecasts of active aircraft were weighted by the types of aircraft based at ANC. The resulting weighed growth rate (3.0% per year) was then adjusted upwards slightly to reflect the historic trend of aircraft registrations in Anchorage (See Table 2.6).<sup>15</sup>

The resulting adjusted growth rate, 3.6 percent per year, was then used to forecast based aircraft at ANC over the forecast period. As shown in Table 2.8, based aircraft at ANC are projected to increase from 41<sup>16</sup> in 2003 to approximately 83 in 2023.

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<sup>14</sup> For example, income variables often yielded a negative coefficient and it does not hold theoretically that income would be negatively correlated with GA activity.

<sup>15</sup> The growth in based aircraft at ANC is much larger than that projected for Lake Hood primarily because of the number of jet aircraft based at ANC (assumed to be about 20 jets based at ANC). The FAA expects that the growth in jets will far outpace growth in other aircraft types.

**Table 2.8**

**Forecast of GA Operations at ANC(a)**

<b>Year</b>	<b>ANC Based Aircraft</b>	<b>Lake Hood Based Using ANC (b)</b>	<b>Total Based Aircraft Using ANC (c)</b>	<b>Operations per Based Aircraft</b>	<b>Operations Forecast(d)</b>
2003	41	68	109	647.7	70,723
2008	49	71	120	660.8	79,242
2013	58	74	132	674.1	89,173
2023	83	80	163	701.5	114,442
<b>Average Annual Growth Rate</b>					
<b>2003-2023</b>	<b>3.57%</b>	<b>0.83%</b>	<b>2.03%</b>	<b>0.40%</b>	<b>2.44%</b>

(a) Includes both GA operations and “on demand” AT operations at ANC.

(b) Assumed to be 6.5%. Held constant over forecast period. Calculated by multiplying 6.5% by the projected number of Lake Hood based aircraft in Table 2.7. See text for details.

(c) ANC based aircraft + Lake Hood based aircraft projected to use ANC.

(d) (ANC based aircraft + Lake Hood based aircraft using ANC) x Operations per Based Aircraft.

Projecting the number of operations per based aircraft at ANC was more complex than it was for Lake Hood because some aircraft that are based at Lake Hood actually take-off and/or land at ANC. In other words, a portion of the GA operations at ANC is actually generated by aircraft that are based at Lake Hood. This portion is important to the ANC GA forecast because the types of aircraft based at ANC and Lake Hood differ significantly and the FAA assumes different growth projections for each category of aircraft (i.e. single engine piston, jet etc.). As noted in Table 2.8, it is assumed that approximately 6.5 percent of aircraft based at Lake Hood use ANC runways and this percentage is held constant over the forecast period.<sup>17</sup> This portion of Lake Hood aircraft using ANC runways does not significantly impact the Lake Hood forecast (assuming it is held constant) because no jets are based at Lake Hood — the growth rates for the majority of Lake Hood based aircraft is about the same.

With this in mind, the following steps were taken to project the number of operations per based aircraft and ultimately the number of GA operations at ANC (Table 2.8):

<sup>16</sup> See assumption #3 in the General Assumptions section.

<sup>17</sup> This percentage is based on an observation survey conducted by Airport staff between 10:00 a.m. and 8:00 p.m. during a 12-day period (July 19 – August 1, 2004).

1. Grew ANC based aircraft at 3.6% per year.
2. Calculated the number of Lake Hood based aircraft using ANC (6.5% of the projected number of Lake Hood based aircraft in each forecast year).
3. Summed based aircraft from Steps 1 and 2.
4. Weighted FAA growth rate for operations per based aircraft by all the based aircraft expected to use ANC runways (ANC based aircraft and portion of Lake Hood based aircraft expected to use ANC runways).
5. Used weighted growth rate developed in Step 4, 0.40%, to grow operations per based aircraft at ANC.
6. Multiplied number of based aircraft reached in Step 3 by estimated number of operations per based aircraft derived in Step 5. The calculation in this step is the same as the one used to forecast operations at Lake Hood but is slightly more complicated because two sets of based aircraft are involved.

### *Results—Based Aircraft Approach*

As shown in Table 2.8, total aircraft operations at ANC are projected (using the based aircraft method) to grow by about 2.4 percent per year over the forecast period from 70,723 in 2003 to 114,442 in 2023.

Over the last 15 years, GA operations at ANC have dropped by about 1.4 percent per year; however, they have increased since hitting their low in the mid-1990s (Figure 2-1). GA operations at ANC dropped off significantly in 2001, but have shown some growth since then. The U.S. economy is starting to show signs of recovery and the FAA forecast indicates that the general aviation industry is rebounding, especially when it comes to jets, and is expected to show strong growth in the coming years.

### **2.3.4 Summary – Lake Hood and ANC GA Activity Forecast**

Table 2.9 presents the results of the Lake Hood and ANC GA forecasts as well as the aggregated forecast for the two airports. Two forecast methods were used to project activity at Lake Hood, the Regression Analysis Approach and the Based Aircraft Approach. The Lake Hood forecast is presented as a range in Table 2.9, with the results from the Regression Analysis Approach representing the low-end of the range and the results from the Based Aircraft Approach representing the high-end of the range.<sup>18</sup>

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<sup>18</sup> See discussion on Lake Hood forecast results for an explanation about the use of a range.

**Table 2.9**  
**Forecast of GA Operations at ANC and Lake Hood**

<b>Year</b>	<b>Lake Hood Operations Regression Approach(a)</b>	<b>Lake Hood Operations Based Aircraft Approach(b)</b>	<b>ANC GA Operations(c)</b>	<b>Combined Total(d)</b>	<b>Combined Total(e)</b>	<b>TAF(f)</b>
2003	58,354	58,354	70,723	129,077	129,077	122,180
2008	63,789	62,125	79,242	143,032	141,367	134,086
2013	65,048	66,140	89,173	154,222	155,314	145,933
2023	67,231	74,966	114,442	181,673	189,408	
<b>Average Annual Growth Rate</b>						
<b>2003-2023</b>	<b>0.71%</b>	<b>1.26%</b>	<b>2.44%</b>	<b>1.72%</b>	<b>1.94%</b>	<b>1.70%</b>

(a) Table 2.5.

(b) Table 2.7.

(c) Table 2.8.

(d) Lake Hood forecast using Regression Analysis Approach plus ANC GA operations.

(e) Lake Hood forecast using Based Aircraft Approach plus ANC GA operations.

(f) FAA's Terminal Area Forecast) AT and GA operations minus estimated number of scheduled regional/commuter operations. Assumes that approximately 60% of AT category is commuter operations. See text for details.

Operations at Lake Hood are expected to increase by between 0.7 percent and 1.3 percent per year over the forecast period, from 58,354 in 2003 to between 67,231 and 74,966 in 2023. GA operations at ANC are expected to grow more quickly (2.4% per year) than those at Lake Hood and increase from 70,723 in 2003 to 114,442 in 2023. When the forecasted operations for the two airports are combined, total GA operations are expected to grow between 1.7 percent and 1.9 percent per year, from 129,077 in 2003 to between 181,673 and 189,409 in 2023.

### **2.3.5 Comparison to TAF**

The FAA's Terminal Area Forecast includes projections for four categories of operations, Air Carrier, Air Taxi & Commuter, GA (local and itinerant) and Military (local and itinerant). As mentioned above, the TAF for ANC includes both operations at ANC and Lake Hood. Comparing the results in Table 2.9 to the TAF is complicated by the fact that the FAA combines scheduled regional/commuter and "on-demand" air taxi in the same category. Based on a data pull from the Official Airline Guide (OAG), which includes

scheduled passenger flight information, it is estimated that about 40,000 scheduled regional/commuter operations took place at ANC in 2003. Total AT operations at ANC totaled about 63,000 in 2003. Thus, an estimated 60 percent of the AT operations at ANC in 2003 were actually scheduled regional/commuter operations. If this percentage is held constant over the forecast period, the results in Table 2.9, under both scenarios, are within 10 percent of the TAF through 2020, the year to which the TAF extends.

### **2.3.6 Comparison to Anchorage Area General Aviation System Plan Forecast**

The Anchorage Area General Aviation System Plan Forecast published in February 2004 includes forecasts for GA activity at Lake Hood and ANC through 2020. Compared to the operations forecast presented in Table 2.9, the System Plan forecast is higher for Lake Hood and lower for ANC. However, the System Plan forecast assumes an average annual growth rate for Lake Hood that is very similar to that projected using the Regression Analysis Approach. The System Plan forecasts for Lake Hood and ANC rely on different base years than those presented in Table 2.9. GA operations at ANC have increased while operations at Lake Hood have decreased since their respective System Plan forecasts were completed.

### **2.3.7 Breakout of Local and Itinerant GA Operations**

In 2003, the number of GA and “on-demand” air taxi operations at Lake Hood and ANC totaled 129,007. Of these, approximately 4.7 percent were local operations and this percent is projected to drop to 3.5 percent by 2023 (See Tables 2.10 and 2.11). The projected drop is based on the TAF—[projected number of local operations divided by (total GA operations + estimated “on-demand” air taxi operations)]. Over the last 5 years, the split of local operations at Lake Hood and ANC has remained constant, with about 97 percent taking place at LHD. This split is expected to remain constant over the forecast period.

**Table 2.10**  
**Forecast of Local GA Operations at ANC and Lake Hood**  
**Using Regression Analysis Approach for Lake Hood**

Year	Combined Lake Hood and ANC Operations(a)	Percent Local(b)	Total Local Operations	Lake Hood Share of Operations(c)	Total Local Operations Lake Hood	Total Local Operations Anchorage
2003	129,077	4.7%	6,039	97.0%	5,858	181
2008	143,032	4.3%	6,209	97.0%	6,022	156
2013	154,222	4.0%	6,298	97.0%	6,025	186
2023	181,673	3.5%	5,985	97.0%	6,109	189
<b>Average Annual Growth Rate</b>						
<b>2003-2023</b>	<b>1.72%</b>	<b>-1.49%</b>	<b>0.21%</b>	<b>0.00%</b>	<b>0.21%</b>	<b>0.21%</b>

(a) Table 2.9, Regression Analysis Approach for Lake Hood.

(b) 2003 based on Airport statistics. Growth rate based on the estimated local/itinerant split in the TAF. See text for details.

(c) Average share 1999-2003.

**Table 2.11**  
**Forecast of Local GA Operations at ANC and Lake Hood**  
**Using Based Aircraft Approach for Lake Hood**

Year	Combined Lake Hood and ANC Operations(a)	Percent Local(b)	Total Local Operations	Lake Hood Share of Operations (c)	Total Local Operations Lake Hood	Total Local Operations Anchorage
2003	129,077	4.7%	6,039	97.0%	5,858	181
2008	141,367	4.3%	6,136	97.0%	5,952	184
2013	155,314	4.0%	6,255	97.0%	6,067	188
2023	189,408	3.5%	6,566	97.0%	6,369	197
<b>Average Annual Growth Rate</b>						
<b>2003-2023</b>	<b>1.94%</b>	<b>-1.49%%</b>	<b>0.42%</b>	<b>0.00%</b>	<b>0.42%</b>	<b>0.40%</b>

(a) Table 2.9, Based Aircraft Approach for Lake Hood.

(b) 2003 based on Airport statistics. Growth rate based on the estimated local/itinerant split in the TAF. See text for details.

(c) Average share 1999-2003.

### 2.3.8 Forecasted Fleet Mix – Based Aircraft

Table 2.12 includes the based aircraft fleet forecast for Lake Hood and ANC. Almost all of the aircraft based at Lake Hood are single engine pistons and this is expected to remain the case over the forecast period. Jets currently account for about 49 percent of the based GA aircraft at ANC. This percentage is expected to increase to nearly 68 percent by 2023 as projected growth in jets outpaces that of other types of GA aircraft.

**Table 2.12**  
**Fleet Mix Forecast, Based Aircraft(a)**

<b>Year</b>	<b>Single Engine Piston</b>	<b>Multi- Engine Piston</b>	<b>Turboprop</b>	<b>Jet</b>	<b>Total(b)</b>
<b>Lake Hood</b>					
2003	1,009	36	4	-	1,049
2008	1,053	36	4	-	1,093
2013	1,098	36	5	-	1,139
2023	1,195	36	6	-	1,238
<b>Average Annual Growth Rate (c)</b>					
<b>2003- 2023</b>	<b>0.85%</b>	<b>0.06%</b>	<b>1.98%</b>	<b>0.00%</b>	<b>0.83%</b>
<b>ANC</b>					
2003	3	3	15	20	41
2008	3	3	16	26	49
2013	3	3	18	34	58
2023	3	3	20	56	83
<b>Average Annual Growth Rate (c)</b>					
<b>2003- 2023</b>	<b>0.44%</b>	<b>-0.34%</b>	<b>1.57%</b>	<b>5.30%</b>	<b>3.57%</b>

(a) Each aircraft type is projected to grow at the FAA growth rate for the U.S. adjusted to reflect the historical trend in registered aircraft in Alaska.

(b) Tables 2.7 and 2.8.

(c) All figures are rounded to the nearest digit. Therefore, small increases and/or decreases, may not be apparent.